

THE BOLLMAN TRUSS
OF
HARPERS FERRY

M. F. Brothers.

THE BOLLMAN TRUSS OF HARPER'S FERRY.

The Bollman truss bridge of Harper's Ferry, West Virginia was built in 1852 and was designed and constructed by Wendell Bollman - a prominent bridge engineer at that time. This bridge was built for the Baltimore and Ohio Rail Road and was known as the Winchester Span of the Baltimore and Ohio R. R. Viaduct at Harper's Ferry.

The bridge was used by the Rail Road until about 1897, when another bridge was built for railroad traffic. However, the Bollman Bridge is yet in use for vehicular traffic.

The span of this bridge is one hundred and twenty-four feet between abutments and the length of cast iron in the ~~stretch~~er is one hundred and twenty-eight feet.

In designing this bridge Bollman used a combination of cast and wrought iron; the former being used for members which were to be subjected to compression and the latter in those which would be subjected to tension, thus utilizing the special qualities of the two metals. The weight of cast iron used in the truss is sixty-five thousand, one hundred and thirty-seven pounds and of wrought iron is thirty-three thousand five hundred and twenty-seven pounds, making a total weight of ninety-eight thousand, six hundred and sixty-four pounds.

This type of bridge unites the principles of the suspension and the truss bridges. Each bar performs its own part in supporting the load in proportion to its distance from the abutment, so that the entire series of suspending rods, transmits the same tension to the point of support, as would be equally transmitted from thence to the center of the bridge. Each bar or rod is straight and of uniform size and therefore the principle of calculations is that of a lever.

The stretcher or straining beam, the vertical posts and suspension bars compose the essential features of the bridge. Each post is hung by two bars from both ends of the stretcher independently of all the others and each post and pair of tension bars, with the stretcher form a separate truss. Seven independent trusses are used and these transfer the weight concentrated on each floor beam, directly to the abutments without aid from any other connections; and not from panel to panel as in general use.

Since the weight of the bridge has only a vertical pressure at the piers, the necessary dimensions of masonry may be very moderate; and are four feet square at the base, twelve feet high and two feet nine inches at the top.

This system, although perfect in itself, is additionally connected by diagonal rods in each panel, also by light, hollow castings acting as struts. The diagonal side rods might safely be dispensed with, for the peculiar merit of the truss is its perfect independence of such provision. They are therefore used as a safeguard only, in case of the fracture of any of the principal suspension rods.

Bollman states that the advantage of this type of bridge is, that it carries out fully the permanent principle of bridge building, which is;- the direct transfer of force to abutments, simple calculations and certainty of expense items, all of which tend to facilitate the erection of secure, economical and durable structures.

It is interesting to note, however, that this type of bridge has become obsolete in modern bridge construction.

To prove the rigidity of construction of the "Bollman Truss" a test ^{was} made. Three locomotives with tenders were weighed and then run upon the bridge at the same time, nearly covering its whole length and weighing in aggregate one hundred and thirty-six tons, or about one ton per foot.

This burden was tried at about eight miles per hour, and the deflection at the center post was one and three eighth inches and at the first post was nine sixteenth of an inch.

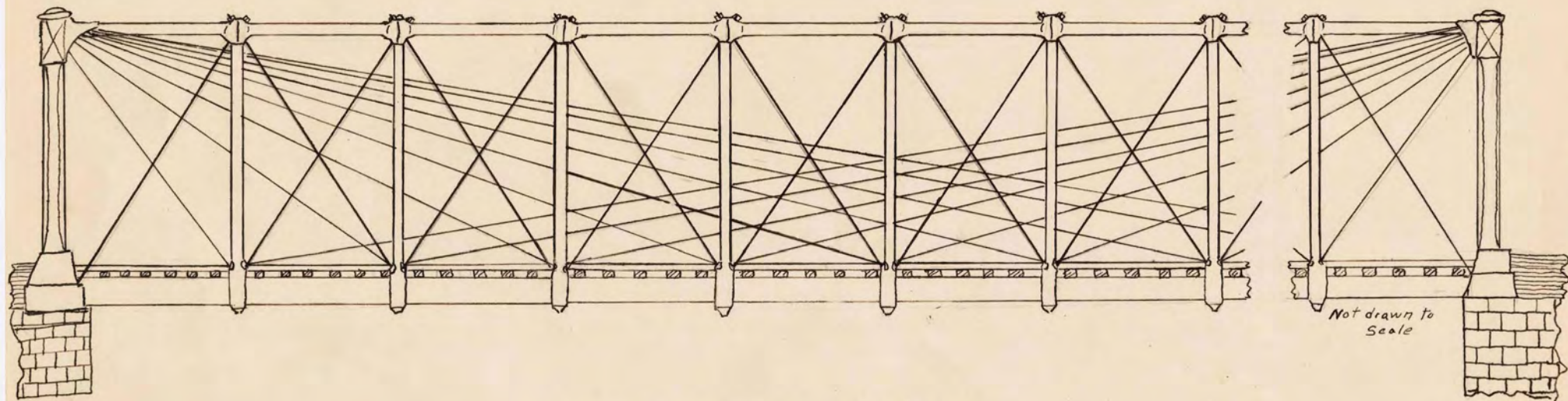
References;-

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Engineers..... Vol. 21, July, 1889.

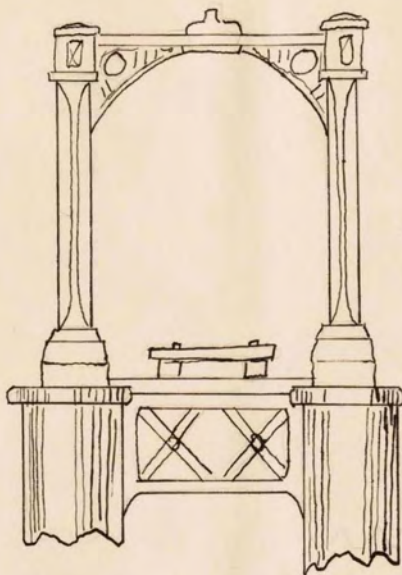
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THE BALTIMORE AND OHIO RAILROAD BRIDGE AT
HARPER'S FERRY? WEST VIRGINIA.

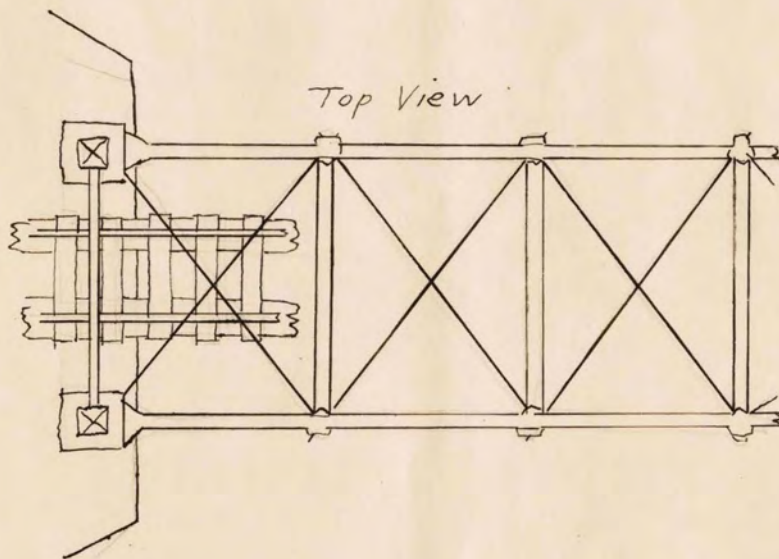
By Wendell Bollman.



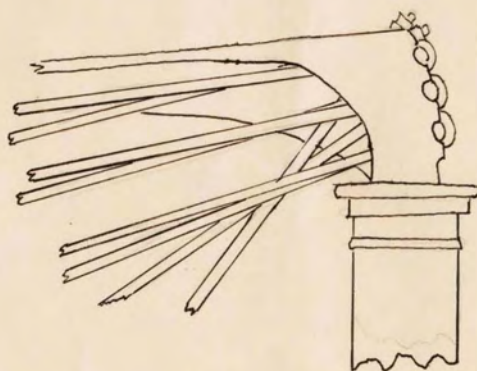
THE BOLLMAN TRUSS
Harpers Ferry West Virginia
Span 124 feet.



End View



Top View



Rod Suspension